CLAIMS

1. A liquid crystal display device comprising two substrates sandwiching a liquid crystal having spontaneous polarization, and electrodes for applying a voltage to said liquid crystal,

wherein said liquid crystal shows a monostable state in which an average molecular axis of a director of liquid crystal molecules is aligned in a single direction and present in a first position when no voltage is applied, shows a state in which the average molecular axis is tilted in one direction from the first position at an angle corresponding to a magnitude of a voltage of a first polarity and present in a second position when the voltage of the first polarity is applied, and shows either a state in which the average molecular axis maintains the first position or a state in which the average molecular axis is tilted in a direction opposite to said one direction from the first position and present in a third position when a voltage of a second polarity opposite to the voltage of the first polarity is applied, and

a temperature range of either one of a cholesteric phase and a chiral nematic phase of a phase sequence of said liquid crystal has a temperature width of not less than 3°C.

2. The liquid crystal display device of claim 1,

wherein the temperature range of either one of the cholesteric phase and the chiral nematic phase of the phase sequence of said liquid crystal has a temperature width of not less

than 5°C.

3. The liquid crystal display device of claim 1,

wherein said liquid crystal is a ferroelectric liquid crystal.

4. The liquid crystal display device of claim 2,

wherein the temperature range of either one of the cholesteric phase and the chiral nematic phase of the phase sequence of said liquid crystal has a temperature width of not less than 10°C.

5. The liquid crystal display device of claim 2,

wherein said liquid crystal is a ferroelectric liquid crystal.

6. The liquid crystal display device of claim 4,

wherein said liquid crystal is a ferroelectric liquid crystal.

7. The liquid crystal display device of claim 1, further comprising a back-light which is driven by a field-sequential color scheme,

wherein a data-writing scanning voltage and a data-erasure scanning voltage are applied to said electrodes.

8. A manufacturing method of a liquid crystal display device comprising two substrates sandwiching a liquid crystal

having spontaneous polarization, and electrodes for applying a voltage to said liquid crystal, wherein said liquid crystal shows a monostable state in which an average molecular axis of a director of liquid crystal molecules is aligned in a single direction and present in a first position when no voltage is applied, shows a state in which the average molecular axis is tilted in one direction from the first position at an angle corresponding to a magnitude of a voltage of a first polarity and present in a second position when the voltage of the first polarity is applied, and shows either a state in which the average molecular axis maintains the first position or a state in which the average molecular axis is tilted in a direction opposite to said one direction from the first position and present in a third position when a voltage of a second polarity opposite to the voltage of the first polarity is applied, and a temperature range of either one of a cholesteric phase and a chiral nematic phase of a phase sequence of said liquid crystal has a temperature width of not less than 3°C, said manufacturing method comprising the steps of:

introducing said liquid crystal between said two substrates;

performing an alignment treatment to bring said liquid crystal into the monostable state by cooling said liquid crystal at a cooling rate of not more than 3°C/minute after heating said liquid crystal.

9. The manufacturing method of a liquid crystal display device of claim 8,

wherein the alignment treatment is performed after heating said liquid crystal to an isotropic phase.

10. A manufacturing method of a liquid crystal display device comprising two substrates sandwiching a liquid crystal having spontaneous polarization, and electrodes for applying a voltage to said liquid crystal, wherein said liquid crystal shows a monostable state in which an average molecular axis of a director of liquid crystal molecules is aligned in a single direction and present in a first position when no voltage is applied, shows a state in which the average molecular axis is tilted in one direction from the first position at an angle corresponding to a magnitude of a voltage of a first polarity and present in a second position when the voltage of the first polarity is applied, and shows either a state in which the average molecular axis maintains the first position or a state in which the average molecular axis is tilted in a direction opposite to said one direction from the first position and present in a third position when a voltage of a second polarity opposite to the voltage of the first polarity is applied, and a temperature range of either one of a cholesteric phase and a chiral nematic phase of a phase sequence of said liquid crystal has a temperature width of not less than 3°C/minute, said manufacturing method comprising the steps of:

introducing said liquid crystal between said two substrates;

performing an alignment treatment to bring said liquid

crystal into the monostable state by applying a DC voltage of not lower than 3 V between said electrodes after heating said liquid crystal.

11. The manufacturing method of a liquid crystal display device of claim 10,

wherein the alignment treatment is performed after heating said liquid crystal to an isotropic phase.

12. A manufacturing method of a liquid crystal display device comprising two substrates sandwiching a liquid crystal having spontaneous polarization, and electrodes for applying a voltage to said liquid crystal, wherein said liquid crystal shows a monostable state in which an average molecular axis of a director of liquid crystal molecules is aligned in a single direction and present in a first position when no voltage is applied, shows a state in which the average molecular axis is tilted in one direction from the first position at an angle corresponding to a magnitude of a voltage of a first polarity and present in a second position when the voltage of the first polarity is applied, and shows either a state in which the average molecular axis maintains the first position or a state in which the average molecular axis is tilted in a direction opposite to said one direction from the first position and present in a third position when a voltage of a second polarity opposite to the voltage of the first polarity is applied, and a temperature range of either

one of a cholesteric phase and a chiral nematic phase of a phase sequence of said liquid crystal has a temperature width of not less than 3°C, said manufacturing method comprising the steps of:

introducing said liquid crystal between said two substrates;

performing an alignment treatment to bring said liquid crystal into the monostable state by causing a cooling rate when a DC voltage is applied between said electrodes to be lower than a cooling rate when no voltage is applied, after heating said liquid crystal.

13. The manufacturing method of a liquid crystal display device of claim 12,

wherein the alignment treatment is performed after heating said liquid crystal to an isotropic phase.

14. A manufacturing method of a liquid crystal display device comprising two substrates sandwiching a liquid crystal having spontaneous polarization, and electrodes for applying a voltage to said liquid crystal, wherein said liquid crystal shows a monostable state in which an average molecular axis of a director of liquid crystal molecules is aligned in a single direction and present in a first position when no voltage is applied, shows a state in which the average molecular axis is tilted in one direction from the first position at an angle corresponding to a magnitude of a voltage of a first polarity and present in a second position when the voltage of

the first polarity is applied, and shows either a state in which the average molecular axis maintains the first position or a state in which the average molecular axis is tilted in a direction opposite to said one direction from the first position and present in a third position when a voltage of a second polarity opposite to the voltage of the first polarity is applied, and a temperature range of either one of a cholesteric phase and a chiral nematic phase of a phase sequence of said liquid crystal has a temperature width of not less than 3°C, said manufacturing method comprising the steps of:

introducing said liquid crystal between said two substrates;

performing an alignment treatment to bring said liquid crystal into the monostable state by providing a period in which the temperature of said liquid crystal during cooling is kept within a temperature range showing either one of the cholesteric phase and the chiral nematic phase, after heating said liquid crystal.

15. The manufacturing method of a liquid crystal display device of claim 14,

wherein the alignment treatment is performed after heating said liquid crystal to an isotropic phase.